



The fifth system is known as a "terminal node controller" -- a Pac-comm product that handles packet data communication via radio. An unusual breed of computer network has quietly appeared in the last 2-3 years, a sort of digital anarchy of the airwaves, a computer network without corporate substrate. Anybody with a ham radio license and a bit of equipment can participate -- sending mail cross-country, transferring files, conferencing, and so on. The network is young, but already offers coast-to-coast trunk connections, automatic message forwarding, dozens of linked bulletin board systems, and its own orbiting satellite mailbox. With packet operation possible from the bicycle via the handlebar keyboard and LCD display, I can communicate data from a campground or while pedaling. Ain't technology wonderful?

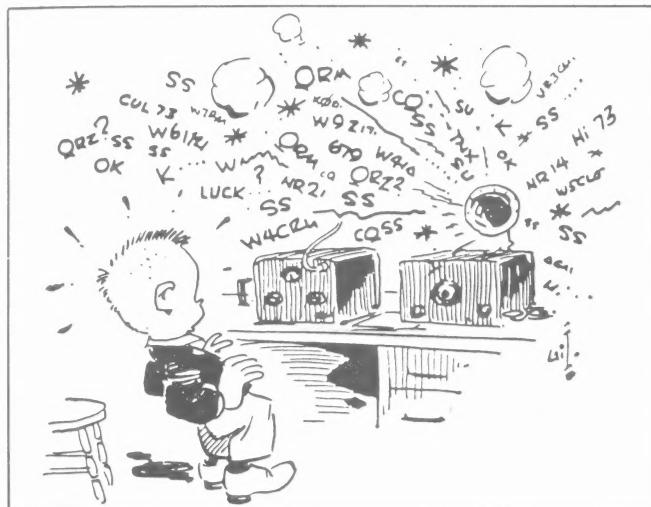
The handlebar keyboard itself is simple: four pushbutton switches are buried in each foam grip, spaced about .75" apart. I type in a binary code, sort of an ASCII with decoded zone bits: my five strongest fingers, three on the right and two on the left, produce the lower-case alphabet; the right little finger capitalizes. The left little finger is the control key, its neighbor selects numeric and special keys, and those two together cause the others to take on system level meanings such as file operations and major edit functions. In practice, it's easy -- a lot like playing the flute -- with each combination accepted by the system when all buttons are released.

(continued next month)

**PODUNK WEEKEND -- AUGUST 1-2**

The club's annual Podunk, UT outing will be held on the weekend of August 1 and 2, 1987. Overnight space for campers is by RESERVATION ONLY. Please, as a courtesy to the host and hostess (WB1BRE and KA1LDS), tell them if you are going for the day events only.

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Looking to transfer files between computers that don't like to talk to each other? The June issue of PC Resource magazine has an article called "File Transfers Across the Great Divide". It covers, among other things, ports, modems, RS-232C, commercial solutions (including C128 to IBM/MS-DOS), and converting text files to ASCII. It's written in plain English, so you don't have to be a hacker to understand it.



Reprinted from QST, March, 1959

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DON'T FORGET -- if you've recently upgraded or changed your address, phone number, etc., please let club data base manager Dan Vaillancourt, K10SM, know so he can update your record in the data base.

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July '87

## THE ANATOMY OF A HIGH-TECH BICYCLE

by Steven K. Roberts - KA8OVA  
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(Part 2)

The mobile ham radio station (KA8OVA here) is a multimode 2-meter rig from Yaesu. In addition to handling data communication, it allows me to stay in regular voice contact with Maggie (my recumbent-borne traveling companion). Bicycle touring without some form of communication is frustrating, as anyone who has ever squinted into the mirror for minutes at a time well knows. "What happened to him? Is he OK back there?" With a boom microphone built into my helmet and a push-to-talk switch on the handlebars, Maggie is never far away (effective bike-to-bike simplex SSB radio range is over 2 miles). Of course, having 2-meter FM capability on the bike also connects me to a huge network of ham radio operators: I store the local repeater frequencies into the radio's memory as I approach an area, and periodically identify myself as an incoming bicycle mobile. This has led to a number of interesting encounters and places to stay. And -- through the repeaters -- I can make telephone calls directly from the bike.

CB radio is also on board, culturally useless by comparison, but still handy enough to justify its weight. I can talk to truckers, hail a passing motorhome for water (this saved my life in Utah), and chuckle at the residual good buddy subculture that still hangs on long after the death of the great CB boom.

System security is an issue when living on a machine that looks like something from NASA. It's not that people try to steal it -- most are intimidated by the technology -- it's just that some let their curiosity extend to flipping switches and tinkering. To alert me to such behavior, I built in a security system (based on the UNGO box) with vibration and motion sensors; when armed by a front-panel keyswitch, any disturbance causes transmission of a tone-encoded signal that sets off my pocket beeper up to 2-3 miles away. Maggie's bike has a motion

sensor also, and plugs into a front-panel jack when the two machines are parked side-by-side.

Other radio-related devices include a digital shortwave receiver, a Sony Watchman micro-TV, a VHF weather radio, and an FM stereo. Naturally, there is also an audio cassette deck, for sometimes it takes more than a granny gear to climb a mountain...

Speaking of gearing, the bike is equipped with some unusual mechanical hardware. A custom 36-speed crossover system of 3 derailleurs provides a 16.9-inch granny gear, a 23-inch "high granny," and half-step from 33 to 144. With the Zzipper fairing and the recumbent's aerodynamic advantage, I can cruise comfortably at 15-17 mph (assuming a good breakfast and no unfriendly winds). Peak speed so far, flying down a mountain, was 58.1.

Stopping power is critical with my 488-pound gross weight, of course. Moving that much stuff downhill at 58 miles an hour is profoundly exhilarating... but stopping is another matter. The Minnebiko II has three brakes: a Phil Wood disc actuated by my left hand and a pair of Mathauser hydraulics controlled by the right. The disc is nice for speed regulation without rim heating effects; the hydraulics will stop anything, dramatically outperforming the various mechanical models I have tried and discarded over the years. To control them with a single lever, I machined a header for the master cylinders, with a sliding cable stop and proportional transfer bar to permit a variable front-back braking force ratio.

The frame itself was custom made by Franklin Frames of Columbus, Ohio -- after I did enough brazing in my basement to convince myself that framebuilding is an art form. The geometry is entirely custom, suited to my giraffe body and the special requirements of all this on-board hardware.



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Power for the electronic systems is derived from a pair of Solarex photovoltaic panels, producing 20 watts in full sun (roughly 1.3 amps total into the pair of 4 amp-hour batteries). These new SX-LITE units lack the traditional glass and aluminum frame, and are each 12.5 X 17 inches. Since they can pump enough current into the Ni-Cads to overcharge them, I have built in extensive power monitoring and control circuitry: A digital panel meter with a thumbwheel switch can show instantaneous current into or out of each battery (as well as any system voltage), and the BCP can throttle back the charging process if its calculations indicate that the batteries are full (% charge values are displayed on the console).

Other voltages besides the two 12-volt battery buses are needed throughout the system, and this is one of those areas that can cause significant overhead if attention isn't paid to losses. There is a small aluminum box containing Li1870-based switching supplies that coolly provide 3, 5, 6, 9, and -12 volts (all available on the front panel for external accessories). Considering the special requirements of a bicycle system, the extra design effort here has paid off well: when the two processors required for bike monitoring and text editing are active, total system current drain is only 130 millamps. A sixth power supply, unrelated to the others, is mounted up front with a coiled cord to allow battery charging if I have gone too long without sunshine.

Instrumentation on the front panel is largely geared to the major electronic systems already described, but there is also the obligatory Cat-Eye Solar to display speed, distance, cadence, and so on. This elicits interesting comments from fellow bikies, who stare at the machine in awe then suddenly recognize something familiar. In addition, there is an altimeter (useful on mountains, and also helpful in predicting weather conditions), an Etak electronic compass, time/temperature display, and assorted system status indicators.

Mechanically, the electronics package is designed to separate from the bike with a minimum of effort. I open 3 toggle clamps, unplug 6 waterproof connectors, and take it into the tent at night, yielding a "tent control system" just as useful as the mobile variety. The 40-pound unit handles heavy downpours with no problem -- with the fairing and velcro-on waterproof covers, it has withstood all-day rides that quite saturated my Gore-tex. So far, the system has suffered shock and vibration without incident, unfolding easily for service but surviving heavy abuse on the road.

Safety factors are always a major concern when you habitually press your luck by living fulltime

alongside logging trucks, drunks, motorhomes, and the routine madness of the highway. I have become a firm believer in helmets, reflectors, orange flags, and GOOD lights. Bicycle Lighting Systems offers a line of industrial-grade products that quite outshine the typical bike lights; I went with a 7-inch yellow barricade flasher that makes me look like a roving hole in the road, a 2-inch red taillight, and a 4-inch sealed-beam headlight. In addition, I have recently added a Cycle-Ops halogen helmet light, which has the delightful characteristic of putting light where I'm LOOKING, not just where the bike happens to be pointing. (Admit it. You too have zigzagged drunkenly through neighborhoods at night, trying to highlight street and house number signs...)

Finally, the machine is equipped with all the usual bicycle touring gear: stove, food, clothing, tools, candles, medical supplies, microfiche documentation library, flute, binoculars, camera, maps, digital test equipment, spare inner tubes, frisbee, coffeemaker, office supplies, butane soldering iron, and so on. My tent is a vast "Peak Pod 4" from Peak 1, very much in the porta-condo class at 188 square feet under cover. Other outdoor gear -- North Face down bags, Gore-tex rainsuit, Patagonia bunting, polypro underwear, and so on -- is undergoing constant revision as fabric technologies continue to improve.

There... a marathon overview of the Minnebiko. If any of this seems insane, think about gravity and how long I would continue to drag around something that isn't practical (and, preferably, multifunctional). This whole adventure is a wild blend of serious business and fun -- a case of personal computers and technology carried to an exquisitely mad extreme.

Thanks to all who helped make it possible!

## STOLEN:

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